

- **Context:** Flooding costs UK economy £2.2bn a year, projected to rise by 27% by 2050
- **Collaboration:** NERC, Defra, the Environment Agency and partners worked together to identify and de-risk a more sustainable way to deliver flood and coastal resilience
- **Policy innovation:** Thanks to a strong evidence base Natural Flood Management is now key to UK flood and coastal erosion strategy

Benefits:



Up to 2000s: UK flood and coastal erosion risk management strategy focused on defence and hard engineering

Natural Flood Management (NFM) gradually taken up in UK flood management strategy

2004-05: Defra report changes flood risk narrative - *making space for water* rather than stopping it

2008: Pitt Review emphasises working with nature to reduce impact of flooding

2010-17: Environment Agency recommends NFM approaches pioneered by NERC-funded researchers

2018: Defra 25-year Environment Plan highlights importance of NFM and intention to expand use

2020: NFM becomes prominent in national strategies. Government commits to doubling NFM projects

2022: Environment Agency report on NFM pilot programme shapes work to mainstream NFM

Now: Strategy focused on resilience and adaptation through a basket of measures including NFM

Environment Agency launches £25m NFM programme (2023), as well as investing in NFM through Defra's £5.6bn 2021-27 Flood and Coastal Erosion Risk Management Investment Programme

Powered by evidence from experts, research and real-world trials delivered by NERC, Defra, the Environment Agency and partners

2000-10: NERC research and training addresses emerging government interest in NFM by evaluating different approaches

2009: Defra and NERC pilot projects demonstrate that NFM can reduce flood risk and deliver protection at a lower cost

2015-21: Defra, NERC, Environment Agency, Scottish Environment Protection Agency and Natural Resources Wales co-develop NFM research following successful pilot projects

2021: NFM is key part of £150m Defra / Environment Agency Flood and Coastal Resilience Innovation Programme, building on previous research and involving NERC-funded scientists

2024 onwards: £40m NERC investment in Floods and Droughts Research Infrastructure will provide near real-time data and new technologies that will support NFM delivery

Flood defence screens at Bewdley, Worcestershire

Leaky dam construction on the Upper Aire Project
Mike Leonard

“NERC’s investment in research, and partnership approach to working with us and Defra, has played an influential role in changes to flood and coastal erosion strategy and investment. The academic research provided essential evidence that increased confidence in the effectiveness of NFM measures and steered the design of new investments”.

Environment Agency Research Manager, Floods and Coastal Erosion Risk Management

More information: [£2.2 billion a year statistic](#)

2000-10: NERC research helps address emerging government interest in NFM. It helped build understanding of how local changes in land cover and land management affect water flows and flood risk downstream, which enabled the efficacy of different approaches to be evaluated. Relevant programmes include: [Catchment Hydrology and Sustainable Management](#) (£2m, 2000-05), [Flood Risk for Extreme Events](#) (£5.8m, 2005-10) and [Flood Risk Management Research Consortium](#), EPSRC-led (£6.5m, 2004-08). This research, alongside other NERC input, influenced the [Foresight Future Flooding](#) update - which set the agenda for the Defra 'Making Space for Water' consultation exercise leading to the 2004/5 Defra policy document 'Making Space for Water' – as well as contributing to the Pitt review.

2009: Three 'Making Space for Water' NFM pilot projects led by Defra with [c.£4m](#) (inc. Pickering in Yorkshire, which built on earlier NERC-funded work at the site that “served very much as a [catalyst](#)” for the successful Defra pilot project bid). The projects successfully trialled NFM solutions. They showed it was possible to reduce flood risk and led to the [Environment Agency publishing case studies](#) which gave a range of examples of how this could be achieved. The success of the NFM project at Pickering became a national exemplar and was “[one of the building blocks for securing the £15 million of funding ... dedicated specifically to natural flood management schemes across the UK](#)” according to the then Secretary of State for Environment, Food and Rural Affairs, Andrea Leadsom. The NFM scheme at Pickering was estimated to have saved in the region of [£15m \(10–20%\)](#) compared to a conventional flood management option. In parallel, a separate [NFM scheme at Belford, Northumbria](#), successfully implemented innovative NFM techniques based on NERC, EPSRC and Environment Agency funded research which cost 90% less than the alternative: a £2.1m dam. The outputs also supported the decision to fund the £15m programme.

2015-21: Defra, NERC, Environment Agency, SEPA and NRW co-develop research to fill gaps in evidence required to move NFM into the mainstream. Environment Agency published [the Working with Natural Processes research framework](#) in 2015 - comprehensive list of the research the community needed to undertake to improve evidence and understanding of NFM. NERC researchers fed into the development. The Environment Agency and NERC worked together to develop a research call to help address these gaps and in 2016 NERC ran a workshop to bring people together across the flood risk management community to start to shape the programme that ultimately led to three NERC projects ([Q-NFM](#), [LANDWISE NFM](#) and [PROTECT NFM](#)). In 2017 [£15m Defra NFM programme](#) kicked off practical implementation of NFM at all different scales across the country (2017-21) which also sought to address research gaps through long-term monitoring. [At the same time the £4m NERC NFM programme starts](#) (2017-21) with the aim of improving understanding of the suitability and effectiveness of different NFM measures for a range of flood risk scenarios. NERC-funded researchers held projects in both the NERC and Environment Agency programmes enabling a 2-way interaction between both.

2021: £150m Flood and Coastal Resilience Innovation Programme (FCRIP) launched – that was informed by learnings from the £15m NFM programme. Projects in the FCRIP programme involve NERC scientists and are informed by NERC science.

2024: £40m Floods and Droughts Research Infrastructure (FDRI) NERC-funded project launched, led by the UK Centre for Ecology & Hydrology, aiming to monitor the entire hydrological system in the UK to improve resilience to floods and droughts. FDRI will provide near real-time data and new technologies that will support NFM delivery.

This research contributes to many UN Sustainable Development Goals including:



2004-05: Defra Making Space for Water strategy report: changed the narrative around flood risk management towards making space for water rather than stopping it or getting rid of it as fast as possible. This marked a shift away from structural (embankments, flood channels) and hard engineering solutions for flood and erosion risk management, placing more emphasis on working with natural processes and adopting catchment-based solutions.

2008: Pitt Review: Particularly bad UK flooding in 2007 led to the Cabinet Office's policy report (aka the Pitt Review) in 2008, a landmark moment in the water sector, which emphasised the importance of not just building walls but working with nature to reduce the impacts of flooding. The report also presented flood risk management as a range of tools, highlighting the importance of working across catchments to protect, restore and emulate natural functional catchments.

2010-17: New reports and resources recommend uptake of NFM: Environment Agency published [Working with Natural Processes to Manage Flood and Coastal Erosion Risk](#) in 2010 and [Greater working with natural processes in flood and coastal erosion risk management report](#) in 2012, recommending NFM approaches pioneered by NERC-funded researchers. The Environment Agency's 'opportunity maps' followed in 2016, drawing upon input from NERC-scientists, to help practitioners think about the types of NFM measures that may work in a catchment and the best places to locate them. In 2017 Oxford Saint Martin published [NFM flooding restatement](#) and Environment Agency published [NFM evidence base report](#), presenting the evidence base. The reports showed confidence that NFM reduces flood risk, and the need for upscaling to understand the benefits of NFM at larger scales. In 2016 SEPA [published a handbook](#) to help local authorities and landowners implement natural flood management measures.

2018: Defra 25-year Environment Plan states importance of NFM and intention to expand use of it by testing, encouraging and embedding natural flood management solutions in appropriate places, and alongside more traditional defences where needed, including new ways of financing schemes.

2020: NFM becomes prominent in national flood management strategies – it is a fundamental part of the [National Flood and Coastal Erosion Risk Management Strategy in England](#) (2020), the [Welsh flood risk management strategy](#), and [Defra's Flood and coastal erosion risk management policy statement](#) (2020) and prominent in the ongoing development of [Scotland's Flood resilience strategy](#) (2024). The Government commits to double the number of projects which include nature based solutions to reduce flood risk in the [Flood and coastal erosion risk management Policy Statement](#) (2020), which features NFM throughout.

2022: Environment Agency publish an evaluation report on the £15m Natural Flood Management programme. Learning from this report has been applied to shape work to mainstream NFM, including a series of associated actions in the National Flood and Coastal Erosion Risk Management Strategy Roadmap. This will ensure that the outputs from the NFM programme are embedded in the current and future work of the Environment Agency and its partners.

2023: Environment Agency and Defra announce £25m funding for improving flood resilience through a new NFM programme. It aims to accelerate investment in NFM and inform the way NFM is delivered and funded in the future. The new programme is evaluated and underpinned by NERC science and builds on the learnings of the £15m pilot and NERC NFM programmes.

For more information or to provide feedback, email: impact@nerc.ukri.org